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3M INNOVATIVE PROPERTIES COMPANY
PO BOX 33427
ST. PAUL, MN 55133-3427

EXAMINER

HU, HENRY S

ART UNIT PAPER NUMBER

1713

DATE MAILED: 01/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/759,497

Applicant(s)

FUKUSHI ET AL.

Examiner

Henry S. Hu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on IDS of 4-22-2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☒ Claim(s) 1,3,6,7,15 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4-22-2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. It is noted that USPTO has received one IDS with one page filed on April 22, 2004.

Claims 1-18 are pending now. An action follows.

Specification

2. The disclosure is objected to because of the following informalities:

(a) On **page 4**, line 15, recitation of “Y(CF₂)_qY” has two errors and should be changed to “Y(CF₂)_qY” without using any space.

(b) On **page 4**, line 32, recitation of “di(tbutylperoxy)hexane” should be changed to “**di(t-butylperoxy)hexane**” to be consistent with the same wording used on page 4 at line 33.

(c) On **page 6**, line 33, recitation of “n- heptyl” should be changed to “**n-heptyl**” without using any space.

(d) On **page 18**, line 5, recitation of “a elastomeric” should be changed to “**an elastomeric**”.

Appropriate corrections for (a) - (d) are required.

Claim Objections

3. Claims 1, 3, 6-7, 15 and 18 are objected to because of the following informalities:

(a) On **Claim 1** at line 6 and **Claim 15** at line 7, both two recitations of “**TR-10 of -20°C or less**” are not commonly known in the art. The examiner suggests it is better to rewrite by using whole name “Retraction at lower temperature” as disclosed on page 18 at line 9.

(b) On **Claim 1** at lines 3-4, phrase of “**substantially no perfluorinated vinyl ether monomers**” may be better rewrite by using with the detailed statement as defined on page 2 at lines 27-29. Otherwise it is not clear where is the ceiling at all on claim.

(c) On **Claim 1** at line 2, **Claim 3** at line 1, **Claim 6** at line 1, **Claim 15** at line 2 and **Claim 18** at line 2, the use of “including” and “further including” should be change to “comprising” and “further comprising” according to traditional wording used in the art.

(d) On **Claim 7** at line 3, recitation of “**R₁2 U**” should be changed to “**R₁2-U**” by using a dash line. Otherwise it is not clear whether they are connected or not.

(e) On **Claim 7** at line 4, recitation of “**Y(CF₂)_q Y**” has two errors and should be changed to “**Y(CF₂)_qY**” without using any space.

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(f) On **Claim 15** at line 5, the component (b) at least one cure site moiety is clearly outside of the component (a), i. e. elastomeric copolymer. This statement is quite different from that of Claim 1 wherein at least one cure site moiety is inside of elastomeric copolymer.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. *The limitation of parent Claim 1 in present invention relates to a compound comprising:*
(a) **an elastomeric copolymer** including interpolymers derived from vinylidene fluoride monomer, at least one cure site moiety, and substantially no perfluorinated vinyl ether monomers; (b) **a curable component**; and (c) **at least one mineral filler**, such that upon vulcanization the resulting compound has a **TR-10 of -20°C or less**. Parent Claim 15 relates to Claim 1 **without** the limitation of using mineral filler, while other parent Claim 18 relates to the process of making a compound of Claim 1. See other limitations of dependent Claims 2-14 and 16-17.

6. Claims 1-10 and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Paglia et al. (US 6,506,460).

Regarding the limitation of two parent composition **Claims 1 and 15** as well as the parent process **Claim 18**, **Paglia et al.** disclose that some UV radiation-curable fluoroelastomer compositions are useful for a **low temperature cure process**, wherein the fluoroelastomers are based on repeating units of vinylidene fluoride, hexafluoropropylene, **at least one halogenated cure site monomer(s)** and optionally tetrafluoroethylene (abstract, line 1-7; column 9, line 43 – column 10, line 61). **Paglia et al.** further disclose that **the polymers in the form of blend have been subjected to routine vulcanization with addition of multifunctional crosslinking agent and conventional mineral fillers** in order to make articles (column 13, line 26-50; column 4, line 27-67). Therefore, **Paglia** does not use perfluorinated alkyl vinyl ether (PAVE) in above-mentioned particular fluorocopolymers (see column 9, line 43-49). Additionally, the disclosure on low temperature cure would meet the limitation of “**TR-10 of -20°C or less**” (column 2, line 13-65).

7. Regarding **Claims 7-9**, **Paglia** discloses that iodine- and bromine-containing monomers are all included and in some cases the bromine atom may be connected directly to the double bond (column 9, line 51 – column 10, line 61; particularly see column 9, line 66 for Claim 9).

Regarding **Claim 14**, since a cure site monomer or a diiodine compound is incorporated in the copolymer for crosslinking purpose, the final cured product would carry the claimed or similar mechanical properties due to the presence of reactive sites in the copolymers.

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Remaining dependent **Claims 2-6, 10 and 16-17** are thereby rejected with the same reason the above rejections of Claims 1, 7-9, 14-15 and 18.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brinati et al. (US 5,175,223 or its equivalent EP 445,839 A1) in view of Araki et al. (US 6,706,819 B1).

Regarding the limitation of two parent composition **Claims 1 and 15** as well as the parent process **Claim 18**, **Brinati et al.** in US and EP patents each discloses the preparation of

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fluoroelastomers having a low Tg and **a low compression set at low temperature** (see column 1, line 42 – column 2, line 18), the fluoroelastomers are based on repeating units of **vinylidene fluoride (60.5-64 wt%)**, hexafluoropropene (30-33 wt%) and tetrafluoroethylene (5-8 wt%) (abstract, line 1-8; also see working examples on column 2, line 60 – column 6, line 44).

Brinati et al. further disclose that **the polymers in the form of blend have been subjected to routine vulcanization with addition of accelerator and conventional fillers** in order to make articles (column 3, line 36-59). It is noted that Brinati does not mention or suggest the use of **perfluorinated alkyl vinyl ether (PAVE)** as co-monomer at all.

10. The Brinati reference is silent about **adding “a cure site moiety” in the course of copolymerization**. Araki et al. teach that **a diiodine compound such as 1,3-diiodoperfluoropropane or if necessary a cure-site monomer** can be incorporated in the copolymerization of fluorinated copolymers (column 7, line 5-26; column 5, line 59 – column 6, line 52; see working example on column 22, lines 35-64). By doing so, such reactive sites in the copolymers can improve crosslinkability in order to obtain better mechanical properties **when cured** (column 10, line 43-60).

In light of the fact that copolymers produced by all the involved references are containing **the same or similar type of fluorinated monomers, which can be obtained through emulsion polymerization and the like**. Therefore, one having ordinary skill in the art would have found it obvious to **modify Brinati’s copolymerization process by adding the cure-site monomer(s)**

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as taught by Araki. One would expect one advantage is that obtaining a final product with better mechanical properties when cured due to the presence of reactive sites in the copolymers.

11. Regarding **Claims 7-9**, Araki teaches that iodine-, chlorine-, nitrile- and bromine-containing monomers are all included and some halogens may be connected directly to the double bond (column 5, line 60; column 6, line 43; column 7, line 5-26; column 5, line 59 – column 6, line 52).

Regarding **Claims 11-12**, Araki teaches that various mineral fillers can be used, and some are surface treated such as a partly fluorinated carbon (column 12, line 34- 67).

Regarding **Claim 13**, Brinati has disclosed including some acid acceptors such as $\text{Ca}(\text{OH})_2$ and MgO in the composition for vulcanization with accelerators (column 3, line 38-59).

Regarding **Claim 14**, since a cure site monomer or a diiodine compound is incorporated in the copolymer for crosslinking purpose, the final cured product would carry the claimed or similar mechanical properties due to the presence of reactive sites in the copolymers.

Remaining dependent **Claims 2-6, 10 and 16-17** are thereby rejected with the same reason the above rejections of Claims 1, 7-9, 11-15 and 18.

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12. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paglia et al. (US 6,506,460) in view of Araki et al. (US 6,706,819 B1).

The discussion of the disclosures of the prior art of **Paglia for Claims 1-10 and 14-18** of this office action is incorporated here by reference. Regarding **Claims 11, 12 and 13**, Paglia is silent about including the claimed mineral filler, a surface-treated mineral filler as well as further comprising acid acceptors, which are all taught by **Araki et al.** in making a curable fluoropolymer composition by including some metal oxides such as SnO₂ and ZnO as well as a partly fluorinated carbon (column 12, line 34- 67). By doing so, the advantage is **such a combination in fillers will produce an effective reinforcing the mechanical properties and imparting more electric conductivity** (column 12, line 45 – column 13, line 59).

Therefore, one having ordinary skill in the art would find it obvious to modify Paglia's composition by including a surface-treated mineral filler as well as further comprising metal oxides useful as acid acceptors as taught by Araki, with an advantages as such a combination in fillers will produce an effective reinforcing the mechanical properties and imparting more electric conductivity, and thereby producing a persistent, reliable and long-lasting product.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicants' disclosure. The following references relate to a compound comprising (a) an elastomeric

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copolymer from vinylidene fluoride and cure site monomer(s) but no perfluorinated vinyl ether,
(b) a curable component; and (c) at least one mineral filler:

US Patent No. **6,191,208 B1 to Takahashi et al.** disclose a curable perfluoroelastomer composition comprising (A) a perfluoroelastomer having units of TFE, PAVE and a nitrile-containing monomer, (B) a curing agent, and (C) anhydrous silica (abstract, line 1-7; column 1, line 50-62). The **nitrile-containing monomers** are 8-CNVE or the like, which **are related to derivatives of perfluorinated vinyl ethers** (column 2, line 60 – column 3, line 25). **No VDF** is used in the copolymer at all. Therefore, Takahashi fails to teach or fairly suggest the limitation of present invention.


US Patent No. **5,384,374 to Guerra et al.** disclose a curable perfluoroelastomer composition comprising (A) a perfluoroelastomer having units of VDF and HFP, (B) a fluorinated ether composition comprising a functional fluoroaliphatic mono- or polyether curing agent, and (C) some curatives and additives (abstract, line 1-4; column 3, line 27-57; column 5, line 3 – column 6, line 57). **No cure-site monomer** is used in the copolymer at all. Therefore, Guerra fails to teach or fairly suggest the limitation of present invention.

14. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Henry S. Hu whose telephone number is **(571) 272-1103**. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Wu, can be reached on (571) 272-1114. The fax number for the organization where this application or proceeding is assigned is (703) 872-9306 for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Henry S. Hu

January 4, 2005


DAVID W. WU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700